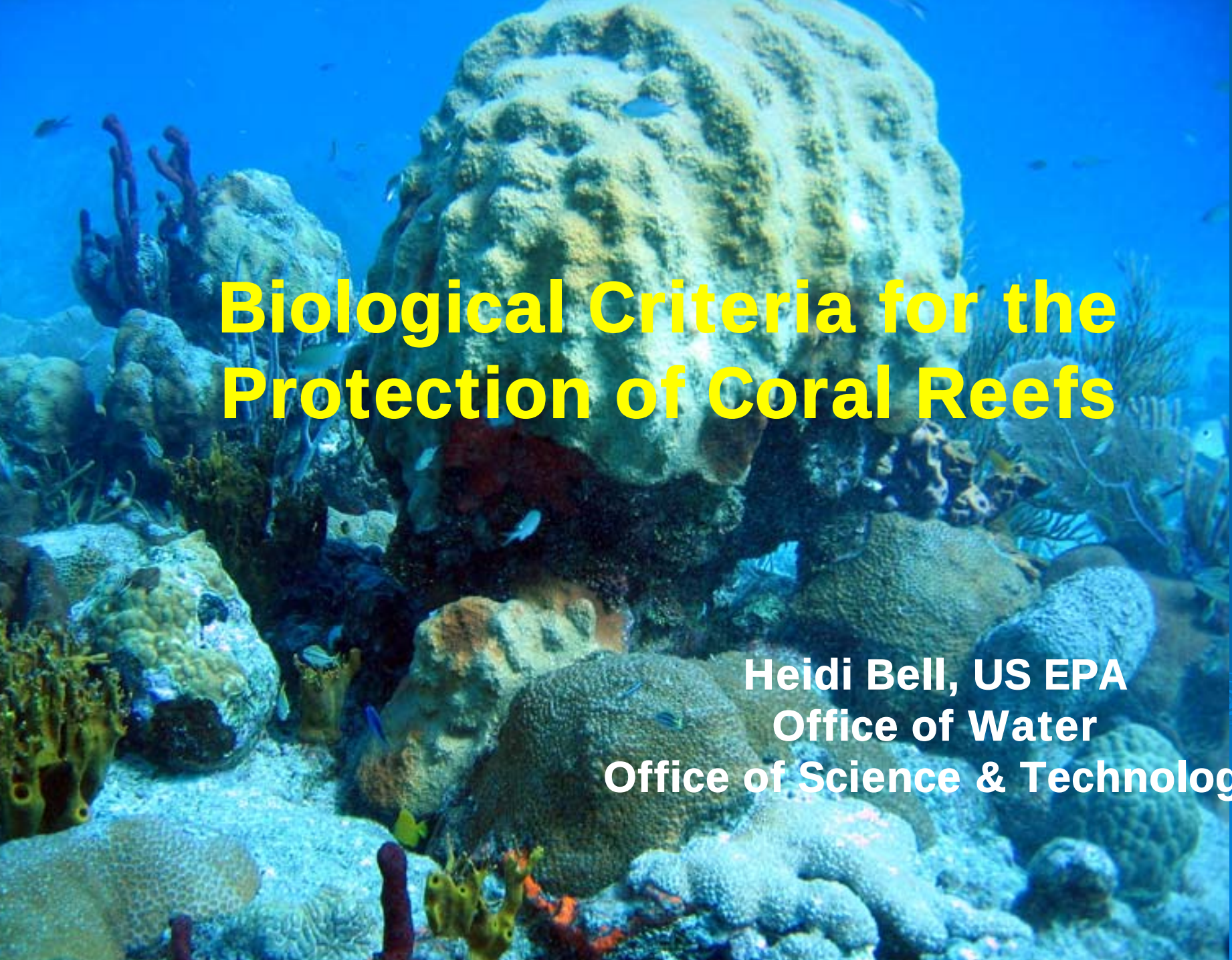
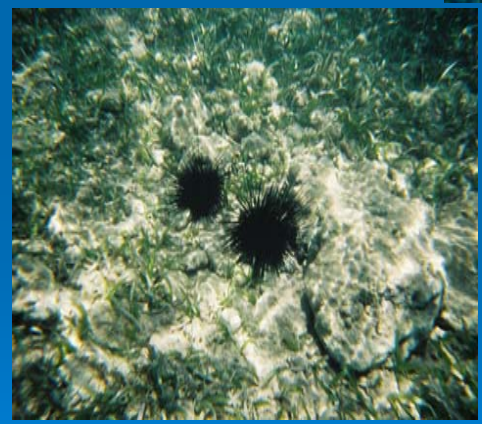


Biological Criteria for the Protection of Coral Reefs

Heidi Bell, US EPA
Office of Water
Office of Science & Technology

Biocriteria for all waters

- Streams and small rivers
- Wetlands
- Lakes and reservoirs
- Estuaries
- Coral Reefs
- Great Rivers
- Great Lakes
- Intermittent and ephemeral streams



EPA

Clean Water Action Section 101(a)

- **Purpose:**
  - ***"To restore and maintain the chemical, physical and biological integrity of the Nation's waters"***

EPA

Biocriteria as a Regulatory Tool

1. **Clean Water Act:**
   - 305(b) - Condition of the Nation's waters—Report to Congress
   - 303(d) - List of impaired waters-- TMDLs
   - 301(h) - POTW discharges to ocean waters
   - 403(c) - Ocean discharge impact criteria
   - **303(c) – Water Quality Standards Programs**
2. Florida Keys NMS and Protection Act
3. Ocean Dumping Act (MPRSA)
4. Rivers and Harbors Act
5. Coastal Zone Management Act

EPA

Statutory Authority

Section 303(c)(2)(A):

....State water quality standards shall consist of designated uses of navigable waters and the criteria for protecting such uses.

....State water quality standards shall protect and enhance the quality of water and serve the purposes of the Act, including protection and propagation of a balanced indigenous populations of fish, shellfish and wildlife ("fishable/swimmable") and recreation in and on the water.

Statutory Authority

Section 304(a)(8):

EPA shall…..develop and publish information on methods for establishing and measuring water quality criteria for toxic pollutants on other bases than pollutant-by-pollutant criteria, including biological monitoring and assessment methods.

Terminology

- **Bioassessments:** an evaluation of the biological condition of a water body using surveys of the structure and function of the community of resident biota of the water body.

- **Biocriteria:** **(regulatory)** Numeric values or narrative descriptions that are established in water quality standards to protect the *biological conditions* of the aquatic life inhabiting waters of a given designated use, implemented in, or through, water quality standards.

EPA

The Linkage From Stressor Effects To Ecosystem Response

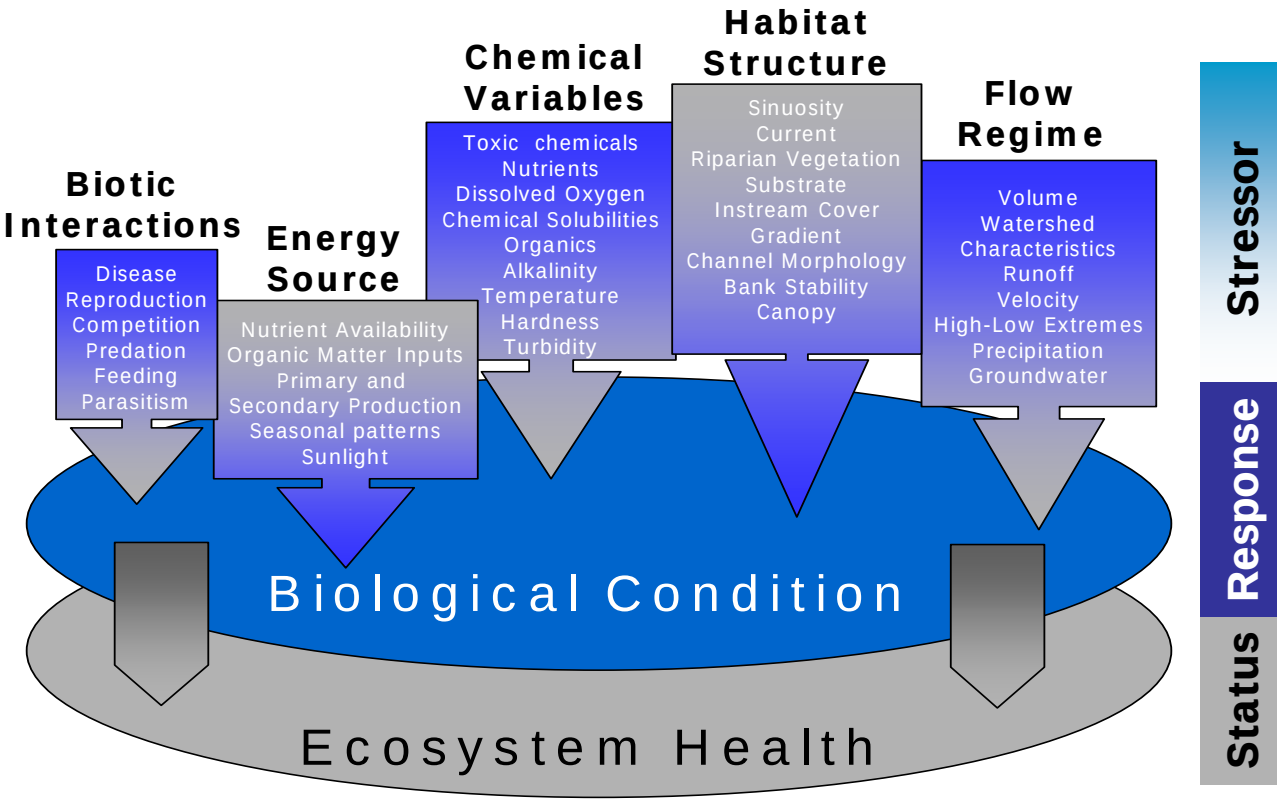
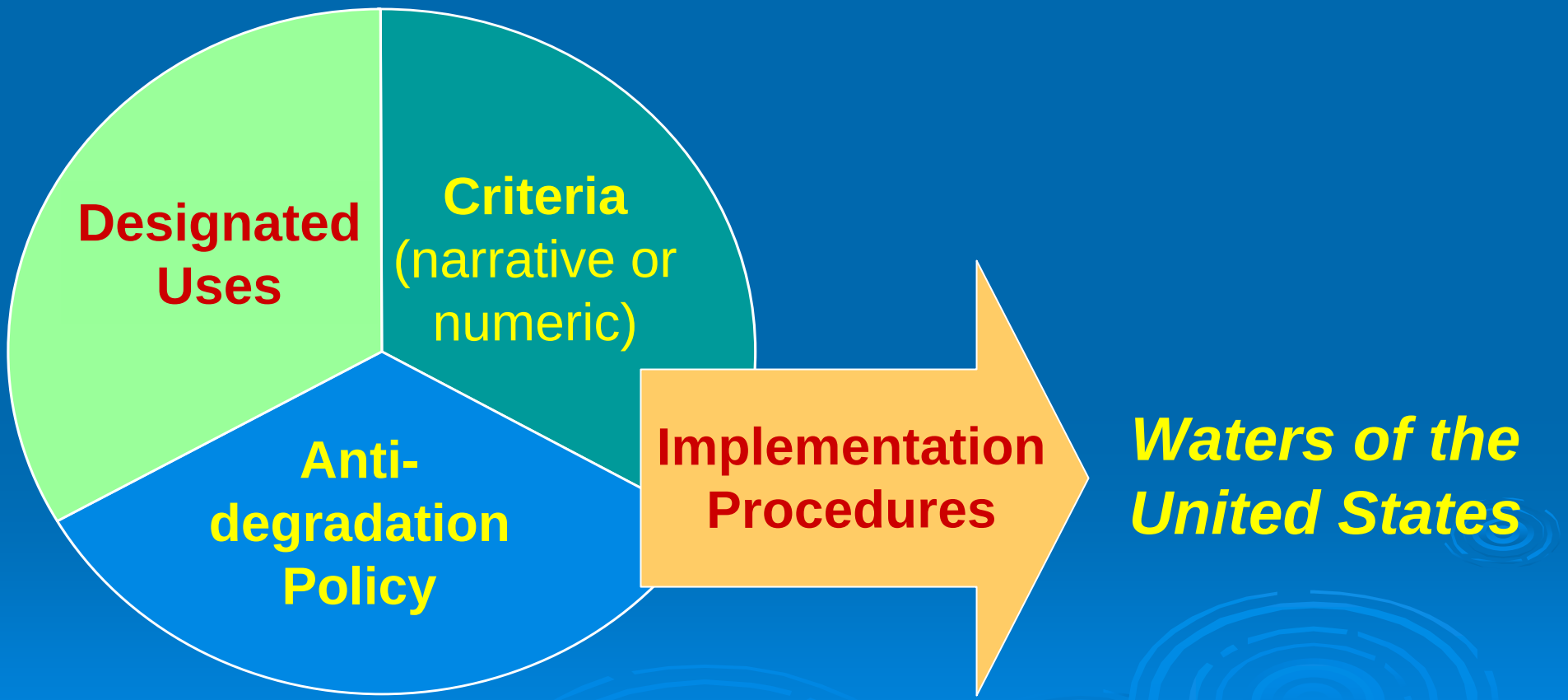


Figure 1. Five classes of environmental variables that affect water resource integrity and overall biological condition (modified from Karr et al. 1986).

Water Quality Standards



Development of Biocriteria

1. Develop appropriate metrics to characterize coral condition
2. Implement metrics in an effective monitoring program
3. Assign designated uses and define biocriteria
4. Monitor to assure compliance
5. Respond to impaired waters

Uses of Biocriteria & Bioassessments

- Help identify stressors
- Impact assessment
- Watershed and ecosystem management
- Mitigation and restoration
- Support enforcement

Important Biological Indicators

- **Community & assemblage structure**
  - Taxa richness, relative abundance, dominance, size frequency distribution
- **Taxonomic composition**
  - Identity, sensitivity (tolerant/intolerant), rare/endangered taxa, non-native
- **Individual condition**
  - Disease, anomalies, contaminant levels, reproductive condition
- **Biological processes**
  - Trophic dynamics, productivity rates, bioerosion, predation, settlement/recruitment rate

EPA

Biological Indicators of Impairment in Coral Reefs

- Lower live coral coverage
- Larger percentage of tolerant species
- Fewer species present
- Greater proportion of exotics
- More disease, lesions, dead corals
- Absence of recruits

Benefits of Coral Reef Biocriteria

- Standardize bioassessment methods
- Compare biological condition across sites and time
- Manage potential degradation related to dredging, permitted discharges, polluted runoff, coastal construction, etc.

EPA Technical Guidance

- Biological Assessments and Criteria: Crucial Components of Water Quality Programs (EPA 822-F-02-006)
- Development of Biological Criteria for Coral Reef Ecosystem Assessment (1998)
- Estuarine & Coastal Marine Waters: Bioassessment & Biocriteria Guidance (EPA-822-B-00-024)
- http://www.epa.gov/waterscience/biocriteria
- http://www.epa.gov/owow/oceans/coral/biocrit/cont.html

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